

Application No.10/659,062  
Filed: September 10, 2003  
TC Art Unit: 2879  
Confirmation No.:3830

REMARKS

In the most recent Office Action, claims 1-19 were pending and examined. Claims 1-19 stand rejected.

In response, claim 1 is amended. Accordingly, claims 1-19 remain pending in the application. No new matter is added.

Applicant thanks the Examiner for the thorough search and consideration of the invention recited in the claims of the present application and responds to the comments in the Office Action as follows.

Claim Rejections 35 U.S.C. §103

The Office Action states that claims 1, 3, 5 and 12 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hsing et al. (GB 2361 581) in view of Jankowski et al. (U.S. Patent No. 3,911,430). In particular, the Office Action states that the disclosure by Hsing et al. teaches each element recited in the claims with the exception of the lens material and means for attaching the metal base to the metal substrate, which are disclosed by Jankowski et al. or generally known in the art in an obvious combination. The rejection is respectfully traversed.

The disclosure by Hsing et al. appears to teach a LED package chip mounted on a substrate or mounted on a submount on the substrate. Apparently, the LED disclosed by Hsing et al. is separately mounted to the substrate or submount as a single unit from a front, or top of the substrate. That is, the LED is inserted to the substrate or submount from the same side of the substrate as is the printed circuit board and lens. This technique can present some disadvantages in the manufacturing process with respect to reliability and testing. Typically, an

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LED is tested after mounting to ensure proper light distribution and a certain quality level of operation. With the device disclosed by Hsing et al., an inspection takes place after the LED is mounted to the substrate, so that the devices that are defective or have poor light distribution causes the entire device to be discarded. In addition, the LED mounted to the substrate as a single unit suffers from the drawbacks noted in the background of the present application. The process of mounting the LED directly to the substrate can decrease the useful life of the LED due to the ranges of temperatures the LED is exposed to during soldering, etc.

In contrast, the present invention recited in claim 1 calls for the substrate to have a through opening in which the metal base having the LED chip mounted thereon is positioned. By permitting the entire device to be constructed of subassemblies, such as by mounting an LED on a metal base, which is then attached to a substrate at a through opening, the present invention permits an improved manufacturing processes. The LED chip mounted on the metal base can be tested and inspected prior to mounting on the substrate, so that any defects or poorly performing devices are discarded simply as the LED and metal base, rather than the entire component.

In addition, due to the smaller mass of the metal base, the mounting process for the LED according to the present invention uses far lower temperature ranges, because the much larger substrate need not be heated. This process also permits energy savings to be realized.

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Applicant notes that the disclosure by Hsing et al. fails to teach or suggest a through opening in a metal substrate in which a portion of a metal base with a mounted LED chip may be positioned.

The disclosure by Jankowski et al. also fails to teach or suggest a through opening in the metal substrate in which the metal base having the LED chip mounted thereon is positioned. Accordingly, the cited references of Hsing et al. and Jankowski et al. do not teach or suggest all the claim limitations recited in claims 1, 3, 5 and 12, either alone or in combination. Because the cited references of Hsing et al. and Jankowski et al. do not teach or suggest all the claim limitations, either alone or in combination, Applicant respectfully submits that the cited references do not support a *prima facie* case of obviousness. Accordingly, Applicant respectfully requests that the rejection of claims 1, 3, 5 and 12 under 35 U.S.C. §103(a) over Hsing et al. in view of Jankowski et al. be reconsidered and withdrawn.

Applicant notes that the Office Action states that it would have been obvious to one of ordinary skill in the art at the time of the invention to attach items to a substrate by means of caulking or press fitting. However, Applicant notes that none of the cited prior art reference indicate the use of a through opening in which the metal base is positioned and attached to the metal substrate by caulking or press fitting. Applicant respectfully submits it would not be obvious to attach a LED chip on a metal base to a substrate by press fitting or caulking in a through opening in the substrate where the substrate and the metal base are in thermal contact. Applicant submits that this limitation recited in the claims should be clearly non-obvious over the cited prior art references, since each and every

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reference apparently teaching mounting a LED directly on a substrate, while the present invention calls for a portion of a metal base including the LED chip to be mounted to the substrate in a through opening.

The Office Action states that claim 2, 8 and 11 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hsing et al. and Jankowski et al. and further in view of Yamaguchi (US Patent No. 6,392,294). In particular the Office Action states that while Hsing et al. did not disclose a through hole in a metal substrate through which the lens is attached, the same is taught by Yamaguchi in an obvious combination.

The Office Action also states that claims 4 and 13 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hsing et al. and Jankowski et al. and further in view of Carey et al. (U.S. Patent No. 6,274,924). In particular, the Office Action states that while Hsing et al. do not close the composition of the metal base, the same is taught by Carey et al. in an obvious combination.

The Office Action further states that claims 6, 15, and 17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hsing et al. and Jankowski et al. and further in view of Odaki et al. (US Publication No. 2001/0050371). In particular, the Office Action states that while the disclosure by Hsing et al. fails to teach a silicon resin, the same is taught by Odaki et al. in an obvious combination.

The Office Action also states that claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hsing et al., Jankowski and Odaki et al., and further in view of Furuyama (U.S. Patent No. 6,516,104). In particular, the Office Action states

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WEINGARTEN, SCHURGIN,  
GAGNEBIN & LEBOVICI LLP  
TEL. (617) 542-2290  
FAX. (617) 451-0313

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that while Hsing et al. do not disclose a through hole in the metal substrate, the same is taught by Furuyama in an obvious combination. Each of the above rejections is respectfully traversed.

Claims 2,4,6-11 and 13-19 ultimately depend upon and further limit claim 1, and include all the limitations of claim 1, as well as the further limitations recited in each dependent claim. Accordingly, claims 2,4,6-11 and 13-19 should be allowable for all the same reasons claim 1 is believed to be allowable. That is, Applicant submits that none of the cited prior art references by Hsing et al., Jankowski et al., Yamaguchi, Carey et al. or Odaki et al. either alone or in combination, teach or suggest a substrate with a through opening in which a portion of a metal base mounting the LED chip is positioned. Applicant has also noted that it should not be considered obvious to attach the metal base to the metal substrate in the through opening through means of caulking or press fitting, since such an attachment is not disclosed or suggested in any of the cited prior art references, and because of the known difficulties concerning accurately mounting an LED chip in relation to a lens. For all the above reasons, Applicant respectfully submits that the rejection of claims 2,4,6-11 and 13-19 under 35 U.S.C. §103(a) in view of the cited prior art references is overcome, and respectfully requests that it be reconsidered and withdrawn.

#### Conclusion

Applicant respectfully believes that in view of the above amendments and discussion, that the application is now in condition for allowance, and earnestly solicits notice to that

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WEINGARTEN, SCHURGIN,  
GAGNEBIN & LEBOVICI LLP  
TEL. (617) 542-2290  
FAX. (617) 451-0313

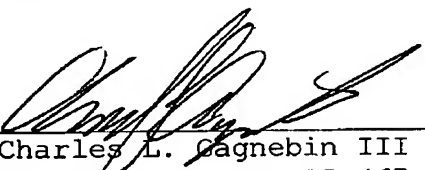
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effect. The Examiner is encouraged to telephone the undersigned attorney to discuss any matter that would expedite allowance of the present application.

Respectfully submitted,

TOMOAKI ABE

By:

  
Charles L. Gagnebin III  
Registration No. 25,467  
Attorney for Applicant(s)

WEINGARTEN, SCHURGIN,  
GAGNEBIN & LEBOVICI LLP  
Ten Post Office Square  
Boston, MA 02109  
Telephone: (617) 542-2290  
Telecopier: (617) 451-0313

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